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## A PSYCHOPHYSIOLOGICAL STUDY OF THE HEMI-SYNC® PROCESS

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*The following summary of this paper, co-authored with Teena Anderson of the TMI research laboratory, delineates the findings described in Ed Wilson's presentation. Dr. Wilson is a neurologist and former associate professor at the University of Tennessee Medical Units. Until this past year, he directed the pain management program at the Colorado Center for Biobehavioral Health. Since then, he has entered into full-time research in his favorite pastime—the EEG correlates of altered states of consciousness.*

Are there significant changes in known physiological variables that occur with binaural beat auditory stimulation? Can Hemi-Sync® enhance the induction of transcendent experience? A series of one male and three female adept subjects were studied and compared with one female and four male naive subjects while listening to the same sequential series of Hemi-Sync sounds. Naive subjects were retested after participating in the GATEWAY VOYAGE® program at The Monroe Institute.

### METHOD

Subjects were connected to a 24-channel computerized EEG with topographical display, the Lexicor Neurosearch-24, and a J & J physiograph measuring skin polarity, digital temperature, respiration, and galvanic skin response. Data was collected at 256 bits per second for ninety seconds at baseline (without sound), during stimulation with pink noise (no embedded frequencies), during each of four sequential beat frequency combinations (Focuses 10, 12, 15, and 21) embedded in pink noise, and during a silent postbase period. Subjective reports of experiential content were obtained during a debriefing period after each experimental condition, and at the end of the experiment. All data was collected while each subject lay prone on a waterbed, with eyes closed, head facing north in a sound- and light- proof chamber, between 10:00 AM and 3:00 PM. Subjects were instructed as to the content of the experiment and methods of data collection during the hookup procedure.

### DATA ANALYSIS

All artifacts were screened for and discarded from the raw data. The raw data was scanned and computed to display color topograms. Events called "burst phenomena" were identified and subjected to time series and cascade analyses. Burst phenomena are high-amplitude peaks of short duration occurring at CZ, or the central zone electrode placed at the center of the top of the head. Physiographic data was correlated to EEG data. Averaged

power/frequency in each experimental condition was compared with the combined auditory beat frequency signal recorded with the EEG data on an auxiliary channel of the EEG.

## RESULTS

The composite beat frequency signal began to correspond to activity at C-3, C-4 (electrodes positioned to the left and right of CZ), and CZ only at the beginning of burst phenomena in adept subjects. This correspondence began at delta and low theta frequencies during Focus 10 and Focus 12 auditory stimulation. These bursts corresponded to changes in time/space orientation and physiologic changes resembling early sleep. As Focus 12 signals progressed to Focus 15, marked splitting in the frequencies began to occur. Low delta and theta activity was maintained in the CZ area with a progressive drop in alpha behind the sylvian sulcus (back of the head). At the same time, burst phenomena began to spread over into the temporal lobe areas at T-4 (electrode above the right ear) and often T-3 (electrode above the left ear) as well. Marked correspondence between low-frequency bursts within the auditory cortex could be seen to amplify in power at CZ, followed by a progression to higher power and frequency activity in T-3 and T-4. These bursts were often accompanied by reported alterations in perceptions of body size and physical content of awareness. The altered perceptions frequently occurred during a reversal of skin polarity. As Focus 21 auditory frequencies were reached, further changes in EEG activity were often noted. Wave-like burst progressions ascended in frequency to as high as 128 Hz, with dominant power in these frequencies as well. This activity would almost exclusively reside in the temporal areas, with the rest of the cortex resembling sleep or very low power/frequency activity. Of the eight subjects exhibiting these phenomena, two showed activation of only the right temporal lobe. They seemed at a loss to remember the exact content of their experience. The five showing bilateral activation seemed to retain rather complete recall of being out-of-body and other psychical content of experience.

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The five subjects measured before and after the *GATEWAY VOYAGE* showed an interesting variability of response to the same series of stimuli. Before *GATEWAY*, initial power of burst activity was higher but frequency progression seemed lower than the adept group. Following the *GATEWAY VOYAGE*, three of the five subjects showed a pattern similar to adept subjects in EEG progression of power/frequency and topography. The other two seemed to have a reversal of effect. In pretest, one showed marked temporal activation and profound transcendent experience. Posttest revealed no temporal activation. When questioned about the change, he reported that his goals in the program were to ground his experience and to reduce the tendency to lose himself in spiritual pursuits or transpersonal experience. The other

subject was a forty-seven-year-old lawyer who showed no shift in the pre- to post-GATEWAY series.

It is interesting that all shifts to high frequency/power activity in the temporal lobes occurred relative to feelings of thankfulness and delight in the experience rather than fear or cognitive analysis of the extraordinary experience. Both at pre- and posttesting, the alpha density at CZ of the two subjects who did not come to resemble adepts was much higher than the three who did. All subjects indicating OBEs and other psychical phenomena in this study tended to have a low alpha density and greater theta and delta power at baseline. This is in direct contrast to the "normal" population, where about eighty-five percent show high alpha activity at baseline with eyes closed. Diminishing high-frequency temporal lobe activity which occurred in the one subject was apparently a strong reflection of the power of will; the active desire to quit "spacing out" and to get busy manifesting his ideas and spiritual awareness in the more concrete ("real") world. The attorney was constantly caught up in an attempt to change his thoughts to more intuitive and feeling perspectives. His efforts at change seemed to block the spontaneity of experience.

## **CONCLUSION**

Progressive binaural beat auditory stimulation seems to evoke predictable changes in EEG power, frequency, and topographic propagation in appropriately prepared subjects whose belief systems and will are congruent with the process and its purpose. EEG demonstrations of the Hemi-Sync signal can only be recognized occasionally at the beginnings of burst phenomena; however, there is a progression of this signal from low to high frequencies spreading from the auditory cortex to CZ, then to the temporal lobes. It has been demonstrated that the most reliable physiographic change that accompanies temporal lobe activation is reversal of skin polarity.

It is possible to separate the role played by the auditory stimulus from that of the group process, belief system, and will of the individual. Content of transcendent or transpersonal experience varied considerably as to detail but showed remarkable similarity in tone or experiential flow among all subjects tested. While experiential content tended to drift toward OBE and transpersonal psychical activity, there was a rather stereotyped progression of EEG activity common to all subjects having these experiences. These changes in EEG activity have also been noted in human natural healing studies, as well as psychical and channeling experiments, in which strong release of personal inhibition and expression of feeling was experienced. It is interesting that high-frequency temporal lobe activation seems to accompany transcendent experience regardless of the context, set and setting, or rationale given for the experience.

Hemi-Sync seems to provide a fairly predictable and non-value-laden process of inner discovery and transcendent experience. It may provide us with a predictable means of quantification of the effects of binaural beat technology on states of consciousness. Further studies in the signal penetration of binaural beat patterns on temporal lobe activation are anticipated.

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